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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/693,482 | 10/21/2003 | Ivan I. Aksenov | AFD 639 | 2529 |
| 26902 7590 07/23/2007 DEPARTMENT OF THE AIR FORCE AFMC LO/JAZ 2240 B ST., RM. 100 WRIGHT-PATTERSON AFB, OH 45433-7109 | | | EXAMINER MCDONALD, RODNEY GLENN | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/693,482

Applicant(s)

AKSENOV ET AL.

Examiner

Rodney G. McDonald

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16-31 is/are allowed.
- 6) ☒ Claim(s) 1, 8 and 11-14 is/are rejected.
- 7) ☒ Claim(s) 2-7, 9, 10 and 15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 8, 11, 12-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Gorokhovskiy (PGPUB 20020007796 A1)

Regarding claim 1, Gorokhovskiy in Fig. 12 teach a filtered cathode arc plasma source having a consumable cathode (12) with an end working surface emitting cathode-material plasma in response to a vacuum arc engagement. A tubular anode (18) adjacent and coaxial with the consumable cathode (12). Figs. 5a, 5b and 6 suggest the cathode chamber be tubular and Fig. 3a suggest a coaxial anode. Cathodic and anode plasma focusing magnetic coils (13) surrounding the consumable cathode (12) and the tubular anode (18) respectively. The consumable cathode (12), tubular anode (18) and focusing magnetic coils (13) comprise a first plasma generator. A plasma filter (47) disposed in communication with the first plasma generator. and including input and output rectilinear plasma ducts each surrounded by direct current magnetic coils (20, 21). The plasma ducts and the plasma generator anode (18) comprising a plasma-guiding channel having at least one exit opening and having a channel configuration exclusive of direct line-of-sight plasma communication between the plasma generator cathode and the exit opening. Electrical energy power supplies

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(19) for providing the vacuum arc and power supplies (inherent) for providing the electromagnetic coils with power. The input and output rectilinear plasma ducts connect in a right angle junction wherein a wall opening in the input plasma duct enable plasma communication between the input and the output rectilinear plasma ducts. The direct current magnetic coils surrounding the input and output rectilinear plasma ducts are supplemented by first and second magnetic filed lines adjustment magnetic coils (20a, 20b) disposed around the input and output rectilinear plasma ducts at the right angle junction and energized by electrical energy power supplies (inherent because of electromagnets). The coils are controlled such that the magnetic field lines are smooth, plasma conveying, low plasma loss continuations of magnetic field lines with the input plasma duct. (See Fig. 12; Page 12 paragraph 134; Page 6 paragraph 84 – Page 8 paragraph 99; Fig. 5a, 5b, 6)

Regarding claim 8, there is a second plasma generator connected to the input plasma duct at an end thereof distal to the first plasma generator. (See Fig. 12)

Regarding claim 11, there are fin members (i.e. baffles) present to particle trap. (See Fig. 12; Page 6 paragraph 085)

Regarding claim 12, Gorokhovskiy teaches a method of generating filtered high quality cathodic-arc plasma comprising the steps of disposing a cathodic arc source (12) of electrons, ions and plasma components within an evacuation chamber contiguously connecting with a right angle bend inclusive plasma magnetic filter apparatus. Establishing a curvilinear pattern of plasma flow (shown by lines with arrows) controlling equipotential magnetic flux lines with the right angle bend inclusive

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plasma magnetic filter apparatus using a plurality of surrounding electrical magnetic elements (20a, 20b) received in selected right angle beam removed locations of the plasma magnetic filter apparatus. Enhancing the curvilinear pattern of plasma flow controlling magnetic flux lines within the right angle bend-inclusive plasma magnetic filter apparatus by adding output duct entrance magnetic coil (21) and corrective magnetic element magnetic fluxes (20) to the curvilinear pattern. The output duct entrance magnetic coil and corrective magnetic coil element magnetic fluxes limiting losses from a flow of selected plasma components traversing the filter apparatus along the magnetic flux lines. The enhancing and limiting steps controlling the areas adjacent the right angle bend. (Fig. 12; Page 6 paragraph 84 – Page 8 paragraph 99)

Regarding claim 13, sidewall collisions are reduced. (Page 7 paragraph 0090)

Regarding claim 14, an enhanced flow of electrons can be permitted to flow into the coating chamber. (See Abstract)

Allowable Subject Matter

Claims 16-31 are allowed.

Claims 2-7, 9, 10, 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 16-23 are allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including the second plurality of

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electromagnetic field generating elements also including a pair of saddle shaped magnetic coils surrounding the input portion and adjacent the output portion of the path of particle axial communication in locations immediately preceding and immediately succeeding the right angle bend.

Claims 24-31 are allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including a first saddle shaped ion path correcting magnetic coil disposed surrounding the input duct element in a downstream location preceding the output duct element and partially surrounding said output duct element adjacent the input duct element and energized by a source of selected magnitude electrical energy; and a second saddle shaped ion path correcting magnetic coil disposed surrounding the input duct element in a downstream location succeeding the output duct element and partially surrounding the output duct element adjacent the input duct element and energized by a source of selected magnitude electrical energy.

Claim 2 is indicated as being allowable over the prior art of record because the prior art of record does not teach the first and second magnetic field lines adjustment magnetic coils each include a first circular portion disposed around said input rectilinear plasma duct and a second flared portion residing substantially orthogonal to said first circular portion and disposed around said output rectilinear plasma duct.

Claim 3 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including an output duct entrance magnetic coil in coaxial disposition with said output plasma duct on an

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opposed lateral surface of said input plasma duct from said output plasma duct and wherein electrical current generating an opposed magnetic polarity flows in windings of said output duct entrance magnetic coil and said output rectilinear plasma duct direct current magnetic coil.

Claim 4 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including the output duct entrance magnetic coil having an inside diameter intermediate an outside diameter of said input duct and a length dimension of said input duct.

Claim 5 is indicated as being allowable over the prior art of record because the prior art of record does not teach the direct current magnetic coils surrounding said input rectilinear plasma duct comprising a first plasma input duct magnetic coil disposed adjacent an open ended entrance portion of said input rectilinear plasma duct and a second plasma input duct magnetic coil disposed adjacent a distal closed end particle trap portion of said input rectilinear plasma duct.

Claim 6 is indicated as being allowable over the prior art of record because the prior art of record does not teach the electrical current generating a same magnetic polarity flows in said first magnetic field lines adjustment magnetic coil and said first plasma input duct magnetic coil and electrical current generating an opposed magnetic polarity flows in both winding turns of said second magnetic field lines adjustment magnetic coil and said second plasma input duct magnetic coil.

Claim 7 is indicated as being allowable over the prior art of record because the prior art of record does not teach said input rectilinear plasma duct further includes an

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electrically isolated plasma component collecting electrode element distally located with respect to said tubular anode element and in a closed end portion of said input rectilinear plasma duct.

Claim 9 is indicated as being allowable over the prior art of record because the prior art of record does not teach the wall opening in said input plasma duct comprises a circumferential slit covered by an electrically insulated screen and wherein said circumferential slit and said electrical insulated screen are disposed in coincidence with a magnetic cusp trap zone generated by magnetic coil fields within said input and output ducts.

Claim 10 is indicated as being allowable over the prior art of record because the prior art of record does not teach the electrical current generating a same magnetic polarity flows in said first magnetic field lines adjustment magnetic coil and said first plasma input duct magnetic coil and electrical current generating same magnetic polarities flows in windings of said output duct entrance magnetic coil and said output rectilinear plasma, duct direct current magnetic coil.

Claim 15 is indicated as being allowable over the prior art of record because the prior art of record does not teach the step which includes establishing magnetic flux magnitudes within said magnetic filter apparatus wherein a Larmour radius characteristic of electrons in said flowing plasma electrons is selected to be much less than a radius dimension of an enclosing duct member of said plasma magnetic filter apparatus, and a Larmour radius characteristic of ions in said flowing plasma ions is

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controlled to be greater than said radius dimension of an enclosing duct member of said plasma magnetic filter apparatus.

Response to Arguments


Applicant's arguments filed September 21, 2005 have been fully considered.

The Examiner has provided a new rejection based on Gorokhovsky (U.S. PGPUB 2002/0007796 A1) which corresponds to The Examiner awaits remarks on the applicability of Gorokhovsky with respect to the claims rejected.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M-TH with every Friday off..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
July 18, 2007